

We Claim

1. A lubrication system comprising  
a reservoir for lubricant;  
5 lubricant delivery means to deliver lubricant to at least one component to be lubricated;  
an injector associated with each component;  
a control system to control the opening and closing of each injector;  
10 scavenge means to remove surplus lubricant from around each component and return it to the reservoir;  
in which each injector comprises a pulsative injector, controlled by the control system to deliver lubricant to its associated component in a series of discrete pulses.
- 15 2. A lubrication system as claimed in Claim 1, in which at least one injector is a multiple step injector.
3. A lubrication system as claimed in Claim 1, in which at least one injector is a variable aperture injector.
4. A lubrication system as claimed in claim 1, in which  
20 at least one injector has a minimum flow bypass.
5. A lubrication system as claimed in claim 1, the lubrication system further comprising sensing means arranged and configured to sense at least one first condition of at least one component, in which the control  
25 system controls the supply of lubricant to at least one component in response to at least one first condition of that component.
6. A lubrication system as claimed in claim 1, in which the lubricant delivery means comprises a pump.
- 30 7. A lubrication system as claimed in Claim 6, in which the lubricant delivery means comprises at least one accumulator to smooth the fluctuations in pressure arising out of the pulsative delivery of lubricant.

8. A lubrication system as claimed in claim 1, in which the scavenge means comprises a variable speed scavenge pump maintaining a substantially constant pressure head and a restrictor associated with each component.

5 9. A lubrication system as claimed in Claim 8, the lubrication system further comprising sensing means arranged and configured to sense at least one second condition of at least one component, in which at least one restrictor is a variable restrictor controlled by the  
10 control system in response to at least one second condition of its associated component.

10. A lubrication system as claimed in Claim 1, the lubrication system further comprising sensing means arranged and configured to sense at least one second  
15 condition of at least one component, in which the scavenge means comprises a pump associated with at least one component, at least one pump being controlled by the control system in response to at least one second condition of its associated component.

20 11. A lubrication system as claimed in Claim 10, in which at least one pump is a constant volume pump.

12. A lubrication system as claimed in Claim 10, in which at least one pump is a constant speed, variable volume pump.

25 13. A gas turbine engine including a lubrication system as claimed in claim 1.

14. A method for lubricating a component of a gas turbine engine, comprising the steps of

storing lubricant in a reservoir;

30 delivering the lubricant to a pulsative injector associated with the component;

controlling the pulsative injector to deliver lubricant to the component in a series of discrete pulses;

scavenging surplus lubricant from the component and returning it to the reservoir.

15. A method for lubricating a component of a gas turbine engine, comprising the steps of

5 storing lubricant in a reservoir;

delivering the lubricant to a pulsative injector associated with the component;

sensing at least one first condition of the component;

controlling the pulsative injector, in response to at  
10 least one first condition of the component, to deliver lubricant to the component in a series of discrete pulses;

scavenging surplus lubricant from the component and returning it to the reservoir.

16. A method according to Claim 14 in which the scavenging  
15 of surplus lubricant comprises the steps of

sensing at least one second condition of the component;

controlling a scavenge pump associated with the component, in response to at least one second condition of  
20 the component, to scavenge surplus lubricant from the component and return it to the reservoir.

17. A method according to Claim 15 in which the scavenging of surplus lubricant comprises the steps of

sensing at least one second condition of the  
25 component;

controlling a scavenge pump associated with the component, in response to at least one second condition of the component, to scavenge surplus lubricant from the component and return it to the reservoir.

30 18. A method according to Claim 16 in which the second condition is one or more selected from the group comprising a pressure, a temperature, a heat flux, an engine speed.

19. A method according to Claim 17 in which the second condition is one or more selected from the group comprising a pressure, a temperature, a heat flux, an engine speed.

20. A method of lubricating a component of a gas turbine  
5 engine in which the component is lubricated by a lubricating system according to claim 1.